## CLAIMS

Sub B1 1. A method for producing a silicon single crystal ingot by the Czochralski method, characterized in that

by adjusting parameters during pulling of the silicon single crystal ingot, and performing pulling of "a silicon single crystal ingot containing a perfectly crystalline part" such that an OSF ring appears at a prescribed position in the silicon single crystal ingot, a production efficiency of "a perfectly crystalline part of the silicon single crystal ingot" and/or of "a part of the silicon single crystal ingot which can be used as wafers" is improved.

2. A method for producing a silicon single crystal ingot by the Czochralski method, characterized in that

$G_{outer}/G_{center}$, which is a ratio of values at a crystal outer edge and at a crystal center of an average value G of a temperature gradient in the crystal in a pulling axis direction, within a temperature range from a silicon melting point to 1350°C, is between 1.10 and 1.50.

Sub C1 3. The silicon single crystal ingot production method according to claim 2, characterized in that the silicon single crystal ingot production is performed while adjusting a distance between a silicon melt and a heat-shield member installed in a Czochralski-method silicon single crystal production equipment.

Sub A1 4. The silicon single crystal ingot production method according to claim 2 or claim 3, characterized in that, when producing the silicon single crystal ingot, a pulling speed of the silicon single crystal ingot is changed.

5. A silicon single crystal wafer, obtained from the silicon single crystal ingot of any one of claims 2 through 4, wherein there exists an OSF ring an inner diameter of which is 70% or less of an overall diameter, and in which there exists, surrounding the OSF ring, a defect free zone occupying 50% or more of a total surface area (on one side).

6. A silicon single crystal wafer, obtained from the silicon single crystal ingot of any one of claims 2 through 4, wherein there ~~exists~~ an OSF ring an inner diameter of which is 50% or less of an overall diameter, and in which there exists, surrounding the OSF ring, a defect free zone occupying 75% or more of a total surface area (on one side).

7. A silicon ingot, pulled by a CZ method under conditions satisfying the following (1) and (2):

(1) $1.15 \leq (G1_{edge}/G1_{center}) \leq 1.25$

(2) $0.5 < (\text{OSF ring inner diameter/crystal diameter}) < 1.06 \times (G1_{center} \times G2_{center})^{-0.2}$

8. A silicon wafer, cut from the silicon ingot of claim 7, characterized in that the inner diameter of the OSF ring is at least 1/2 the inner diameter of the wafer.

9. A method of producing a silicon ingot, characterized in that the silicon ingot is pulled by the CZ method under conditions satisfying the following (1) and (2):

(1) $1.15 \leq (G1_{edge}/G1_{center}) \leq 1.25$

(2) $0.5 < (\text{OSF ring inner diameter/crystal diameter}) < 1.06 \times (G1_{center} \times G2_{center})^{-0.2}$

10. A silicon wafer for non-annealing, cut from a silicon ingot produced by the CZ method, characterized in that an inner diameter of an OSF ring is at least 1/2 a wafer inner diameter.

11. The silicon wafer for non-annealing according to claim 10, characterized in that the silicon ingot is produced by pulling under conditions such that "$1.15 \leq (G1_{edge}/G1_{center}) \leq 1.25$".

12. In a silicon wafer cut from a silicon ingot produced by the CZ method, a method to reduce a density of void defects existing on the inside of an OSF ring by expanding an inner diameter of the OSF ring.

Sub B4

13. In a silicon wafer cut from a silicon ingot produced by the CZ method, a method to improve a gate oxide integrity in an area on the inside of an OSF ring by controlling a ratio of an OSF ring inner diameter to a crystal diameter, G1xG2, and $G1_{edge}/G1_{center}$.

add B5